REMARKS

Favorable consideration and allowance of the subject application are respectfully solicited in view of the following remarks.

Claims 1-7 and 9-13 are pending in this application, with Claims 1, 10 and 11 being independent. Claim 13 is withdrawn from consideration.

Claims 1-7 and 9-12 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over Hirose et al. (U.S. Patent No. 6,203,899) in view of EP 1 048 480 A1 (EP '480). Applicants respectfully disagree with this rejection.

Applicants believe it will be helpful to review some features and advantages of the present invention. As recited in Claim 1, the present invention relates to an ink-jet recording medium having at least a light-reflecting layer and a dye-fixing layer formed in this order on a base material in a multilayer structure. The light-reflecting layer contains two or more pigments that are different in chemical composition. The average particle size of a pigment (A) having the highest liquid absorbency in the pigments is smaller than the average particle size of a pigment (B) having the lowest liquid absorbency in the pigments. The dye-fixing layer comprises not less than 70 mass percent alumina hydrate particles.

Claim 10 is of similar scope, but recites that the light-reflecting layer contains an aluminum pigment and barium sulfate, wherein the average particle size of the aluminum pigment is smaller than the average particle size of the barium sulfate, and that the surface of the dye-fixing layer has a 20°-glossiness of not less than 20%. Claim 11 recites that the light-reflecting layer contains an aluminum pigment and a silica pigment, wherein the average particle size of the aluminum pigment is smaller than the average particle size of the silica pigment.

Hirose et al. discloses an ink-jet recording medium wherein the ink receiving layer includes pigments such as silica and alumina, which are used singly or in combination. The Examiner takes the position that optimization of the particle sizes is the result of routine experimentation.

However, Applicants directed their efforts to the problem of slippage or waviness of surfaces of a recording medium, which is not mentioned in Hirose et al. Since Hirose et al. does not consider or address the problem to be solved by the present invention, Applicants conclude that, even if conducting routine experimentation, a person of ordinary skill in the art would not arrive at the feature of the present invention that solves that problem. That feature, as recited in Claim 1, is that the light-reflecting layer contains at least a combination of a pigment (A) having the highest liquid absorbency and a pigment (B) having the lowest liquid absorbency, with the average particle size of pigment (A) being smaller than the average particle size of pigment (B). (The corresponding feature in Claim 10 is that the average size of the aluminum pigment is smaller than the average particle size of the barium sulfate; the corresponding feature in Claim 11 is that the average particle size of the aluminum pigment is smaller than the average particle size of the silica pigment.)

The recording medium according to the present invention uses pigments (A) and (B) (as recited in claim 1) in order to have sufficient ink absorbency and to bring about the technical advantage that no waviness is caused on the surface at high-density recorded portions, even when the recording medium is used in full-color ink jet recording. (See page 36 of the specification.)

The combination of pigments (A) and (B) is believed to provide the above-mentioned technical advantages by means of the following mechanism:

(1) The reflecting layer is mainly made up of pigment (B), which is only minimally affected in its particle shape and reflectivity by absorption of moisture or by contact with the ink. Thus, the recording medium retains its surface smoothness, even after receiving ink, while maintaining its high reflectivity at the interface with the transparent dye-fixing layer.

(2) However, use of pigment (B) by itself may produce adverse effects such as swelling of the base material and waviness of the recording medium due to the smaller liquid-absorbency (solvent retaining property) of pigment (B), resulting in penetration of the solvent into the fibrous base material.

(3) Use of pigment (A) improves the liquid absorbency of the reflecting layer itself to obtain a higher ink absorbency. Thus, the dye-fixing layer can be made thinner to improve production efficiency and to decrease production cost.

(4) The particles of pigment (A) are smaller than the particles of pigment (B). Therefore, pigment (A) enters the interspaces between the particles of pigment (B) and causes swelling, thus holding the solvent and retaining the shape of the reflecting layer. In contrast, in the case where pigment (A) has a larger particle size than pigment (B) (as described in Japanese Patent Application Laid-Open No. 2001-10222) the particles of pigment (A) that have absorbed the solvent swell by themselves to lose the above-noted effect (1).

(5) The reflecting layer, which has a high liquid absorbency, retards penetration of the solvent into the fibrous base material, thereby preventing swelling of the base material and preventing waviness of the printed portion of the recording face.

(6) The presence of the smaller particles of pigment (A) in the interspaces of the particles of pigment (B) improves the surface smoothness of the reflecting layer, and consequently provides higher smoothness of the dye-fixing layer that is formed on the reflecting layer. (See page 23, line 16 to page 25, line 5 of the specification.)

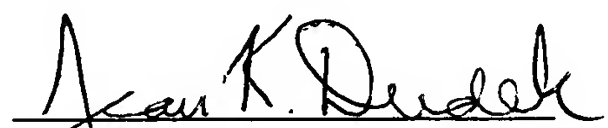
In Applicants' view, this mechanism, focusing on the relative sizes of pigments (A) and (B), is neither taught nor suggested in either Hirose et al. or EP '480. Applicants therefore conclude that it would not have been obvious in view of Hirose et al. and/or EP '480 to optimize the relative sizes of the particles so as to result in the features recited in the present claims.

Applicants therefore conclude that the cited references do not teach or suggest the features of the present invention as recited in Claims 1, 10 and 11, and Applicants submit that the present invention is patentably defined by independent Claims 1, 10 and 11. The dependent claims are allowable for the reasons given regarding Claim 1, as well as for the patentable features recited therein. Individual consideration of the dependent claims is respectfully solicited.

Applicants submit that the instant application is in condition for allowance. Favorable reconsideration and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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